of a more even hardness throughout by warming it, as in tempering steel; but the heat must not be nearly so great. Brass, heated to the blue heat of steel, is almost soft again. To soften brass, heat it nearly to a dull red and allow it to cool, or, if time is an object, it may be cooled by plunging into water.

Drawing Temper from Brass.—Brass is rendered hard by hammering or rolling, therefore when a brass object requires to be tempered the material must be prepared before the article is shaped. Temper may be drawn from brass by heating it to a cherry red and then simply plunging it into water, the same as though steel were to be tempered.

BREWING BEER:

Beer is produced by the alcoholic fermentation of a mixture of malted barley and hops.

Barley is steeped in water to soften the husk and to make the grain ready for the sprouting process. The moist grains are set aside for about eight days during which time sprouting takes place.

The grains are then dried and ground to a coarse powder.

The powder is placed in a mash tub and live steam is applied to it. This converts the starch into maltose and other sugars. This liquid which is called wort is heated, for several hours and during this time hops are added. The hops give the beer its bitter taste.

The solution is drawn off from the solid matter and cooled.

Yeast is now added and the fermentation which begins almost immediately is allowed to continue for about 10 to 12 days depending upon the termperature.

The beer is then aged for several months and finally the clear product is drawn off from the sediment and bottled.

Remedies for Fetid Breath.—Fetid breath may be due to the expelled air (i.e., to disease of the respirational tract), to gases thrown off from the digestive tract, or to a diseased mouth. In the first two cases medication must be directed to the causative diseases, with the last, antisepsis principally and the neutralization of the saliva, also the removal of all residual food of dental caries.

I.—Potassium permanganate..... 1 part
Distilled water.... 10 parts

Mix and dissolve. Add from 5 to 8 drops of this solution to a glass of water and with it gargle the mouth.

II.—Infusion of salvia 250 parts
Glycerine..... 30 parts
Tincture of myrrh 12 parts
Tincture of lavender..... 12 parts
Labarraque's solution ..... 30 parts

Mix. Rinse the mouth frequently with this mixture.

III.—Decoction of chamomile..... 30 parts
Glycerine..... 80 parts
Chlorinated water. 15 parts

Mix. Use as a gargle and mouth wash.

IV.—Peppermint water 500 parts
Cherry-laurel water..... 60 parts
Borax..... 25 parts

Mix and dissolve. Use as gargle and mouth wash.

V.—Thymol..... 3 parts
Spirit of cochlearia..... 300 parts
Tincture of rhatany..... 100 parts
Oil of peppermint 15 parts
Oil of cloves..... 10 parts

Mix. Gargle and wash mouth well with 10 drops in a glass of water.

VI.—Salol..... 5 parts
Alcohol..... 1,000 parts
Tincture of white canella..... 30 parts
Oil of peppermint..... 1 part

Mix. Use as a dentifrice.

VII.—Hydrogen peroxide..... 25 parts
Distilled water... 100 parts

Mix. Gargle the mouth twice daily with 2 tablespoonfuls of the mixture in a glass of water.

VIII.—Sodium bicarbonate..... 2 parts
Distilled water... 70 parts
Spirit of cochlearia 30 parts

Mix a half-teaspoonful in a wineglassful of water. Wash mouth two or three times daily.

BRICK STAIN.

To stain brick flat the color of brownstone, add black to Venetian red until the desired shade is obtained. If color ground in oil is used, thin with turpentine, using a little japan as a drier. If necessary to get the desired shade add yellow ocher to the mixture of red and black. If the work is part old and part new, rub the wall down, using a brick

for a rubber, until the surface is uniform, and keep it well wet while rubbing with cement water, made by stirring Portland cement into water until the water looks the color of the cement. This operation fills the pores of the brick and makes a smooth, uniform surface to paint on. Tinge the wash with a little dry Venetian red and lampblack. This will help bring the brick to a uniform color, so that an even color can be obtained with one coat of stain.

BRICK OF MOTH REPELLANT. (Cake Form):

Powdered black pepper	1 pound
Powdered cedar sawdust	1 pound
Powdered gum camphor	1 pound
Powdered cassia bark	1 pound
Powdered myrrh	5 ounces
Powdered soap	5 ounces
Oil of lemon	2 drams
Wood alcohol	sufficient

Add oil of lemon to pepper, mixing until it is ABSOLUTELY absorbed, no moisture remaining, and the pepper again perfectly dry and in "powder" form as it was before the oil was added. Then add the other powders mentioned above, mixing the whole mess most thoroughly together. At this point add *just* enough wood alcohol as is sufficient to form the powdered mixture into a stiff mass, which is then to be rolled out until about one inch in thickness. This big flat "cake" is then to be cut into small cakes or "bricks." Each brick should be wrapped in parchment paper to protect it from the air.

BRITANNIA METAL:
See Alloys.

BRITANNIA METAL, TO CLEAN:
See Cleaning Preparations and Methods.

BRITANNIA, SILVERPLATING:
See Plating.

BROMINE, ANTISEPTIC:
See Antiseptics.

BROMOFORM.

Bromoform is insoluble in dilute alcohol, but may be dissolved by the aid of glycerine. The following formula has been devised:

Bromoform	1 part
Alcohol	2 parts
Compound tincture of cardamon	2 parts
Glycerine	1½ parts

Some other formulas are:

Syrup of Bromoform.—Bromoform, 5 parts; alcohol (95 per cent), 45 parts; glycerine, 150 parts; syrup, 800 parts. Mix in the order given and place the container in warm water until the syrup becomes perfectly clear.

Emulsion of Bromoform.—Add 3 parts of bromoform to 20 parts of expressed oil of almond; emulsify this mixture in the usual manner with 2 parts of powdered tragacanth, 4 parts of powdered acacia, and sufficient water, using for the completed emulsion a total of 120 parts of water, and add, finally, 4 parts of cherry-laurel water.

Bromoform Rum.—Bromoform, 1.2 parts; chloroform, 0.8 parts; rum, sufficient to make 120 parts. Claimed to be an effective remedy in the treatment of whooping cough.

BRONZES:
See Alloys.

BRONZE CASTING:
See Casting.

BRONZE, IMITATION:
See Plaster.

BRONZE POLISHES:
See Polishes.

BRONZE, RENOVATION OF:
See Cleaning Compounds.

Bronze Powders, Liquid Bronzes, Bronze Substitutes, and Bronzing

BRONZE POWDERS.

Gold bronze is a mixture of equal parts of oxide of tin and sulphur, which are heated for some time in an earthen retort. Silver bronze is a mixture of equal parts of bismuth, tin, and mercury, which are fused in a crucible, adding the mercury only when the tin and the bismuth are in fusion. Next reduce to a very fine powder. To apply these bronzes, white of egg, gum arabic, or varnish is used. It is preferable to apply them dry upon one of the above-named mediums serving as size, than to mix them with the liquids themselves, for in the latter case their luster is impaired.

Simple Coloring of Bronze Powder.—In order to impart different colors to

bronze powders, such as pale yellow, dark yellow to copper red, the powder is heated with constant stirring in flat iron pans until through the oxidation of the copper—the bronzes consist of the brass powder of an alloy from which the so-called Dutch gold is produced—the desired shade of color is reached. As a rule a very small quantity of fat, wax, or even paraffine is added in this operation. The bronze powders are employed to produce coatings or certain finishes on metals themselves or to give articles of wood, stone, pasteboard, etc., a metallic appearance.

General Directions for Bronzing.—The choice of bronze powders is determined by the degree of brilliancy to be obtained. The powder is mixed with strong gum water or isinglass, and laid on with a brush or pencil, almost but not absolutely dry. A piece of soft leather, wrapped around the finger, is dipped into the powder and rubbed over the work; when all this has been covered with the bronze it must be left to dry, and the loose powder is then cleared away with a hair pencil.

LIQUID BRONZES.

Liquid Bronzes.—I.—For the production of liquid bronze, acid-free varnish should be used, as bronze ground with ordinary varnish will form verdigris. For the deacidification of dammar rosin pour 1,000 parts of petroleum benzine over 350 parts of finely ground dammar rosin, and dissolve by repeated shaking. Next add to the solution 250 parts of a 10-per-cent aqueous solution of caustic soda and shake up well for 10 minutes. After standing for a short time two strata will have formed, the upper one consisting of benzine-rosin solution and the lower, aqueous one containing the resinic acid dissolved as soda salts. Pour off the benzine layers and agitate again assiduously with 250 parts of the 10-per-cent caustic-soda solution. Now set aside for a complete classification and separation of the two liquids. The dammar solution siphoned off will be perfectly free from acid. To obtain gold-bronze varnish add to the deacidified dammar solution about 250 parts of bronze or brocade per liter.

II.—Or else carefully mix 100 parts of finely ground dammar rosin with 30 parts of calcined soda and heat to fusion, in which state it is maintained 2 or 3 hours with frequent stirring. Let cool, grind the turbid mass obtained, and pour a little coal benzine or petroleum benzine over it in a flask. By repeated shaking of the flask the soluble portion of the molten mass is dissolved; filter after allowing to settle; into the filtrate put 300 to 400 parts of bronze powder of any desired shade, the brocades being especially well adapted for this purpose. If the metallic powder remains distributed over the mass for a long time it is of the right consistency; if it deposits quickly it is too thin and a part of the solvent must be evaporated before stirring in the bronze powder.

III.—A liquid bronze, which, while it contains no metallic constituent, yet possesses a metallic luster and a bronze appearance, and answers excellently for many purposes, is made as follows: Dissolve by the aid of gentle heat 10 parts of aniline red and 5 parts of aniline purple in 100 parts of alcohol. When solution is complete, add 5 parts of benzoic acid, raise the heat, and let boil from 5 to 10 minutes, or until the greenish color of the mixture passes over to a clear bronze brown. For "marbling" or bronzing paper articles, this answers particularly well.

Incombustible Bronze Tincture.—Finely pulverize 5 parts, by weight, of prime Dammar rosin and 1.5 parts of ammonia soda. Heat gently, and stir frequently, until no more carbonic acid bubbles up. Cool and pulverize again. Put the powder into a glass carboy, and pour over it 50 parts of carbon tetrachloride; let this stand for 2 days, stirring frequently. Then filter. Ten parts of the fluid are mixed with 5 parts of metallic bronze of any desired shade, and put into bottles. Shake well before using.

General Formulas for Bronzing Preparations.—I.—Take 240 parts subacetate of copper, 120 parts oxide of zinc in powder form, 60 parts borax, 60 parts saltpeter, and 3.5 parts corrosive sublimate. Prepare a paste from it with oil, stir together, and continue working with boiled linseed oil and turpentine.

II.—Dissolve 120 parts sulphate of copper and add 120 parts chipping of tin; stir well and gather the precipitating copper. After complete drying, grind very finely in boiled linseed oil and turpentine.

III.—Melt in a crucible 60 parts sulphur and 60 parts stannic acid; stir with a clay tube until the mixture takes on the appearance of Dutch gold and pour out. When cold mix the color with boiled linseed oil and turpentine, adding a small quantity of drier. These three bronzes must be covered with a pale, resistant

lacquer, otherwise they will soon tarnish in rooms where gas is burned.

Florentine Bronzes.—I.—To produce a Florentine bronzing, apply to the articles, which must have previously been dipped, a varnish composed of cherry gum lac dissolved in alcohol. This varnish is put on with a brush, and after that the bronzed piece is passed through the stove.

II.—If the article is of brass it must be given a coat of copper by means of the battery. Next dip a brush in olive oil and brush the piece uniformly; let dry for 5 or 6 hours and place in sawdust. Then heat the article on a moderate charcoal dust fire.

Preparation of French Bronze.—French bronze may be prepared by reducing to a powder hematite, 5 parts, and plumbago, 8 parts, and mixing into a paste with spirit of wine. Apply the composition with a soft brush to the article to be bronzed and set it aside for some hours. By polishing with a tolerably hard brush the article will assume the beautiful appearance of real bronze. The desired tint may be regulated by the proportions of the ingredients.

How to Bronze Metals.—Prepare a solution of 1¼ ounces of sodium hyposulphite in 1 pint of water and add to the same a solution of 1¼ ounces of lead acetate dissolved in 1 pint of water.

If, instead of lead acetate, an equal weight of sulphuric acid (1¼ ounces) is added to the sodium hyposulphite and the process carried on as before, the brass becomes coated with a very beautiful red, which changes to green, and finally a splendid brown with a green and red iridescence. This last is a very durable coating and may be especially recommended. It is very difficult to obtain exact shades by this process without some experience. The thorough cleansing of all articles from grease by boiling in potash is absolutely necessary to success. By substituting other metal salts for the lead acetate many changes in tints and quality of the coatings can also be effected.

When this mixture is heated to a temperature a little below the boiling point it precipitates sulphide of lead in a state of fine division. If some metal is present some of the lead is precipitated on the surface and, according to the thickness of the layer, different colors are produced. To produce an even color the articles must be evenly heated. By immersion of brass articles for 5 minutes the same may be coated with colors varying from gold to copper red, then to carmine, dark red, and from light blue to blue white, and at last a reddish white, depending on the time the metal remains in the solution and the temperature used. Iron objects treated in this solution take a steel-blue color, zinc a brown color. In the case of copper objects a golden yellow cannot be obtained.

New Bronzing Liquid.—Dissolve 10 parts of fuchsine and 5 parts of aniline purple in 100 parts of alcohol (95 per cent) and add to the solution 5 parts of benzoic acid. Boil the whole for 10 minutes until the color turns bronze brown. This liquid can be applied to all metals and dries quickly.

A Bronze for Brass.—Immerse the articles, freed from dirt and grease, in a cold solution of 10 parts of potassium permanganate, 50 parts of iron sulphate, 5 parts of hydrochloric acid in 1,000 parts of water. Let remain 30 seconds, then withdraw, rinse, and let dry in fine, soft sawdust. If the articles have become too dark, or if a reddish-brown color be desired, immerse for about 1 minute in a warm (140° F.) solution of chromic acid, 10 parts; hydrochloric acid, 10 parts; potassium permanganate, 10 parts; iron sulphate, 50 parts; water, 1,000 parts. Treat as before. If the latter solution alone be used the product will be a brighter dark-yellow or reddish-brown color. By heating in a drying oven the tone of the colors is improved.

To Bronze Copper.—This process is analogous to the one practiced at the Mint of Paris for bronzing medals.

Spread on the copper object a solution composed of:

Acetate or chlorhydrate of ammonia..	30 parts
Sea salt.....	10 parts
Cream of tartar.....	10 parts
Acetate of copper....	10 parts
Diluted acetic acid...	100 parts

Let dry for 24 to 48 hours at an ordinary temperature. The surface of the metal will become covered with a series of varying tints. Brush with a waxed brush. The green portions soaked with chlorhydrate of ammonia will assume a blue coloring, and those treated with carbonate will be thick and darkened.

Bronzing and Patinizing of Small Zinc Articles.—Coatings of bronze tones and patina shades may be produced on zinc by means of various liquids, but the

articles, before being worked upon, should be rubbed down with very fine glass or emery paper, to make them not only perfectly metallic, but also somewhat rough, as a consequence of which the bronze or patina coatings will adhere much better. The best bronze or patina effects on bronze are obtained by electroplating the article with a fairly thick deposit of brass rich in copper and then treating it like genuine bronze. The solutions used, however, must always be highly diluted, otherwise they may eat entirely through the thin metallic coating.

Bronzing of Zinc.—Mix thoroughly 30 parts of sal ammoniac, 10 parts of oxalate of potash, and 1,000 parts of vinegar. Apply with a brush or a rag several times, until the desired tint is produced.

Bronze Gilding on Smooth Moldings.—A perfect substitute for dead gilding cannot be obtained by bronzing, because of the radically different reflection of the light, for the matt gilding presents to the light a perfectly smooth surface, while in bronzing every little scale of bronze reflects the light in a different direction. In consequence of this diffusion of light, all bronzing, even the best executed, is somewhat darker and dimmer than leaf gilding. This dimness, it is true, extends over the whole surface, and therefore is not perceptible to the layman, and cannot be called an evil, as the genuine leaf gold is so spotted that a bronzed surface is cleaner than a gilt one. The following process is the best known at present: Choose only the best bronze, which is first prepared thick with pure spirit. Next add a quantity of water and stir again. After the precipitation, which occurs promptly, the water is poured off and renewed repeatedly by fresh water. When the spirit has been washed out again in this manner, the remaining deposit, i. e., the bronze, is thinned with clean, good gold size. The bronze must be thin enough just to cover. The moldings are coated twice, the second time commencing at the opposite end. Under no circumstances should the dry, dead gilding give off color when grasping it firmly. If it does that, either the size is inferior or the solution too weak or the mixture too thick.

Incombustible Bronze Tincture.—Five parts of prime dammar rosin and 1.5 parts of ammonia soda, very finely pulverized. Heat gently, with frequent stirring, until the evolution of carbonic acid ceases. Then take from the fire, and when cool pulverize again. Put the powder into a glass carboy, and pour over it 50 parts of carbon tetrachloride; let this stand for 2 days, stirring frequently, then filter. Ten parts of the fluid are to be mixed with each 5 parts of metallic bronze of any desired shade, and put into bottles. Shake the tincture well before using.

Bronzing Engraved Ornaments.—Take bronze and stir with it pale copal varnish diluted one-half with turpentine. With this paint the ornaments neatly. In ½ hour the bronze will have dried. The places from which the bronze is to be removed, i. e., where the bronze has overrun the polished surface, are dabbed with a small rag soaked with kerosene, taking care that it is not too wet, so as to prevent the kerosene from running into the ornament. After a short while the bronze will have dissolved and can be wiped off with a soft rag. If this does not remove it entirely, dab and wipe again. Finally finish wiping with an especially soft, clean rag. Kerosene does not attack polish on wood. The bronze must become dull and yet adhere firmly, under which condition it has a hardened color. If it does not become dull the varnish is too strong and should be diluted with turpentine.

Durable Bronze on Banners.—To render bronzes durable on banners, etc., the ground must be primed with gum arabic and a little glycerine. Then apply the bronze solution, prepared with dammar and one-tenth varnish. Instead of gum arabic with glycerine, gelatine glue may also be employed as an underlay.

BRONZE SUBSTITUTES.

The following recipe is used in making imitation gold bronzes:

Sandarac	50 parts
Mastic	10 parts
Venice turpentine	5 parts
Alcohol	135 parts
In the above dissolve:	
Metanil yellow and gold orange	0.4 parts
and add	
Aluminum, finely powdered	20 parts

and shake.

If a deeper shade is desired it is well to use ethyl orange and gold orange in the same proportion, instead of the dyes.

For the production of imitation copper bronze take the above-mentioned rosin mixture and dissolve therein only gold

orange 0.8 parts, and add aluminum 20 parts, whereby a handsome copper color is produced. Metanil yellow 0.4 parts without gold orange gives with the same amount of lacquer a greenish tone of bronze. The pigments must not be made use of in larger quantities, because the luster of the bronze is materially affected. Only pigments of certain properties, such as solubility in alcohol, relative constancy to reductive agents, are suitable; unsuitable are, for instance, naphthol yellow, phenylene-diamin, etc. Likewise only a lacquer of certain composition is fit for use, other lacquers of commerce, such as zapon (celluloid) lacquer being unsuitable. The bronzes prepared in this manner excel in luster and color effect; the cost is very low. They are suitable for bronzing low-priced articles, as tinware, toys, etc. Under the action of sun and moisture the articles lose some of their luster, but objects kept indoors such as figures of plaster of Paris, inkstands, wooden boxes, etc., retain their brilliancy for years.

Some use powdered aluminum and yellow organic dyestuffs, such as gold orange. These are employed together with a varnish of certain composition, which imparts the necessary gloss to the mixture.

BRONZE COLORING:

To Color Bronze.—Bronze articles acquire handsome tempering colors by heating. In order to impart an old appearance to new objects of bronze, they may be heated over a flame and rubbed with a woolen rag dipped in finely powdered graphite, until the desired shade is attained. Or else a paste is applied on the article, consisting of graphite 5 parts and bloodstone 15 parts, with a sufficient quantity of alcohol. After 24 hours brush off the dry powder. A hot solution composed of sal ammoniac 4 parts, sorrel salt 1 part, vinegar 200 parts, may also be brushed on. Another way is to dip the pieces into a boiling solution of cupric acetate 20 parts, and sal ammoniac 10 parts, dissolved in 60 to 100 parts of vinegar.

Patent bronzes (products colored by means of aniline dyes) have hitherto been used in the manufacture of toys and *de luxe* or fancy paper, but makers of wall or stained paper have recently given their attention to these products. Wall —or *moiré*—paper prepared with these dyes furnishes covers or prints of silken gloss with a peculiar double-color effect in which the metallic brilliancy characteristic of bronze combines with the shades of the tar pigments used. Very beautiful reliefs, giving rise to the most charming play of colors in perpendicular or laterally reflected light, are produced by pressing the paper lengths or web painted with aniline-bronze dyes. The brass brocade and tin bronzes serve as bases for the aniline dyes; of the tar pigments only basic aniline dyes soluble in alcohol are used. In coloring the pulverized bronze care must be taken that the latter is as free as possible from organic fats. Tar dyes should be dissolved in as concentrated a form as possible in alcohol and stirred with the bronze, the pigment being then fixed on the vehicle with an alcoholic solution of tannin. The patent bronze is then dried by allowing the alcohol to evaporate. This method of coloring is purely mechanical, as the tar dyes do not combine with the metallic bronze, as is the case with pigments in which hydrate of alumina is used. A coating of aniline bronze of this kind is therefore very sensitive to moisture, unless spread over the paper surface with a suitable protective binding medium, or protected by a transparent coat of varnish, which of course must not interfere with the special color effect.

Pickle for Bronzes.—Sulphuric acid, 1,000 parts; nitric acid, 500 parts; soot, 10 parts; sea salt, 5 parts.

Imitation Japanese Bronze.—When the copper or coppered article is perfectly dry and the copper or copper coating made brilliant, which is produced by rubbing with a soft brush, put graphite over the piece to be bronzed so that the copper is simply dyed. Wipe off the raised portions with a damp cloth, so that the copper makes its appearance. Next put on a thin coat of Japanese varnish; wipe the relief again and let dry. Apply 1 or 2 coats after the first is perfectly dry. Handsome smoked hues may be obtained by holding the bronze either over the dust of lighted peat or powdered rosin thrown on lighted coal, so as to obtain a smoke which will change the color of the varnish employed. The varnish must be liquid enough to be worked easily, for this style of bronzing is only applicable to brass.

Green Bronze on Iron.—Abietate of silver, 1 part; essence of lavender, 19 parts. Dissolve the abietate of silver in the essence of lavender. After the articles have been well pickled apply the abietate-of-silver solution with a brush; next place the objects in a stove and let the temperature attain about 150° C.

Blue Bronze.—Blue bronze is pro-

duced by the wet process by coloring white bronze (silver composition) with aniline blue. A blue-bronze color can be produced in the ordinary way from white-bronze color, the product of pure English tin, and with an alum solution consisting of 20 parts of alum in 4,500 parts of water boiled for 5 hours and washed clean and dried. The bronze prepared in this manner is placed in a porcelain dish, mixed with a solution of 15 parts of aniline blue in 1,500 parts of alcohol, stirring the bronze powder and liquid until the alcohol has evaporated entirely and the bronze color becomes dry. This manipulation must be repeated 6 or 8 times, until the desired blue shade is reached. When the bronze is dark enough it is washed out in warm water, and before entirely dry 1 tablespoonful of petroleum is poured on 2 pounds of bronze, which is intimately mixed and spread out into a thin layer, exposed to the air, whereby the smell is caused to disappear in a few days.

Bronzing with Soluble Glass.—To bronze wood, porcelain, glass, and metal by means of a water-glass solution, coat the article with potash water-glass of 30° Bé. and sprinkle on the respective bronze powder.

Brown Oxidation on Bronze.—Genuine bronze can be beautifully oxidized by painting it with a solution of 4 parts of sal ammoniac and 1 part of oxalium (oxalate of potash) in 200 parts of vinegar, allowing it to dry, and repeating the operation several times. These articles, protected against rain, soon lose the unpleasant glaring metallic luster and assume instead a soft brown tint, which bronze articles otherwise acquire only after several years' exposure to the atmosphere. A beautiful bronze color which will remain unaffected by heat can be imparted to bronze articles by the following process: The object is first washed in a solution of 1 part of crystallized verdigris and 2 parts of sal ammoniac in 260 parts of water, and then dried before an open fire till the green color begins to disappear. The operation is repeated 10 to 20 times, but with a solution of 1 part of verdigris crystals and 2 parts of sal ammoniac in 600 parts of water. The color of the article, olive green at first, gradually turns to brown, which will remain unaltered even when exposed to strong heat.

BRONZE POWDERS:

See also Plating for general methods of bronzing, and Varnishes.

Gold and Silver Bronze Powders.—Genuine gold bronze is produced from the waste and parings obtained in gold beating. The parings, etc., are ground with honey or a gum solution, upon a glass plate or under hard granite stones, into a very fine powder, which is repeatedly washed out with water and dried. There are various shades of gold bronze, viz., red, reddish, deep yellow, pale yellow, as well as greenish. These tints are caused by the various percentages of gold or the various mixtures of the gold with silver and copper.

By the use of various salt solutions or acidulated substances other shades can be imparted to bronze. In water containing sulphuric acid, nitric acid, or hydrochloric acid, it turns a bright yellow; by treatment with a solution of crystallized verdigris or blue vitriol in water it assumes more of a reddish hue; other tints are obtained with the aid of cooking salt, tartar, green vitriol, or saltpeter in water.

Gold bronze is also obtained by dissolving gold in aqua regia and mixing with a solution of green vitriol in water, whereupon the gold falls down as a metallic powder which may be treated in different ways. The green vitriol, however, must be dissolved in boiling water and mixed in a glass, drop by drop, with sulphuric acid and stirred until the basic iron sulphate separating in flakes has redissolved. Another way of producing gold bronze is by dissolving gold in aqua regia and evaporating the solution in a porcelain dish. When it is almost dry add a little pure hydrochloric acid and repeat this to drive out all the free chlorine and to produce a pure hydrochlorate of gold. The gold salt is dissolved in distilled water, taking ½ liter per ducat (3½ grams fine gold); into this solution drop, while stirring by means of a glass rod, an 8° solution (by Beaumé) of antimony chloride, as long as a precipitate forms. This deposit is gold bronze, which, dried after removal of all liquids, is chiefly employed in painting, for bronzing, and for china and glass decoration.

Metallic gold powder is, furthermore, obtained by dissolving pure and alloyed gold in aqua regia and precipitating it again by an electro-positive metal, such as iron or zinc, which is placed in the liquid in the form of rods. The gold is completely separated thereby. The rods must be perfectly clean and polished bright. The color of the gold bronze depends upon the proportions of the gold. In order to further increase the brilliancy the dried substance may still be ground.

Mosaic Gold.—Mosaic gold, generally a compound of tin, 64.63 parts, and sulphur, 35.37 parts, is odorless and tasteless, and dissolves only in chlorine solution, aqua regia, and boiling potash lye. It is employed principally for bronzing plaster-of-Paris figures, copper, and brass, by mixing it with 6 parts of bone ashes, rubbing it on wet, or applying it with varnish or white of egg in the preparation of gold paper or for gilding cardboard and wood. Mosaic gold of golden-yellow color is produced by heating 6 parts of sulphur and 16 parts of tin amalgam with equal parts of mercury and 4 parts of sulphur; 8 parts of precipitate from stannic muriate (stannic acid) and 4 parts of sulphur also give a handsome mosaic gold.

The handsomest, purest, and most gold-like mosaic gold is obtained by melting 12 parts of pure tin, free from lead, and mixing with 6 parts of mercury to an amalgam. This is mixed with 7 parts of flowers of sulphur and 6 parts of sal ammoniac, whereupon the mass is subjected for several hours to a heat which at first does not attain redness, but eventually when no more fumes are generated is increased to dark-red heat. This operation is conducted either in a glass retort or in an earthenware crucible. The sal ammoniac escapes first on heating, next vermilion sublimates and some stannic chloride, while the mosaic gold remains on the bottom, the upper layer, consisting of lustrous, golden, delicately translucent leaflets, being the handsomest mosaic gold.

Genuine Silver Bronze.—This is obtained by the finely ground waste from beating leaf silver or by dissolving silver in aqua fortis. This solution is then diluted with water and brightly scoured copper plates are put in, whereby the silver precipitates as a metallic powder.

Imitation Silver Bronze.—This is obtained through the waste in beating imitation leaf silver, which, finely ground, is then washed and dried. In order to increase the luster it is ground again in a dry condition.

Mosaic Silver.—Mosaic silver is an amalgam of equal parts of mercury, bismuth, and tin. One may also melt 50 parts of good tin in a crucible, and as soon as it becomes liquid add 50 parts of bismuth, stirring all with an iron wire until the bismuth is fused as well. As soon as this occurs the crucible must be removed from the fire; then stir in, as long as the contents are still liquid, 25 parts of mercury and mix the whole mass evenly until it can be ground on a stone slab.

BRUSHLESS SHAVING CREAM:

A—Stearic acid	10 pounds
Liquid petrolatum, white	4 pints
Lanolin, anhydrous	2 pounds
B—Triethanolamine	1 pound
Borax	1 pound
Water	15 gallons
Perfume to suit.	

Prepare A by heating stearic acid together with the petrolatum and lanolin to 70° C. In a separate container heat B to boiling and add to it A stirring slowly until cold.

BRUNETTE POWDER:

See Cosmetics.

Brushes

HOW TO TAKE CARE OF PAINT AND VARNISH BRUSHES.

It is a good plan to fill the varnish brush before putting it in the keeper.

Whitewash or kalsomine brushes should not be put into newly slaked lime or hot kalsomine.

Cement-set brushes should never be put in any alcohol mixture, such as shellacs and spirit stains.

Varnish brushes should be selected with a view to their possessing the following qualities: 1st, excellence of material; 2d, excellence of make, which includes fullness of hair or bristles and permanency of binding; 3d, life and spring, or elasticity sufficient to enable the varnisher to spread the varnish without reducing it with turpentine; and 4th, springing, when in use, to a true chisel edge.

Temperature for Brushes.—The bristles of every brush are held in place by the handle. It passes through the shank of the brush and is kiln-dried to fit perfectly. If it shrinks, however, its outward tension is lost and the bristles loosened. For this reason the first principle in brush care is to keep the tool, when it is new or not soaking, in a cool place, out of hot rooms, and any temperature that would tend to shrink the wood of the handle.

Cleaning Paint Brushes.—No new brush should be dipped in the paint and put to work without first being

cleaned. By working it with a brisk movement back and forth through the hand most of the dust and loose hairs will be taken out. A paint brush, when thus thoroughly dry cleaned, should be placed in water for a few minutes, not long enough to soak or swell it, but only until wet through, and then swung and shaken dry. It is then ready to dip in the paint, and although some of the hairs may still be loose, most of them will come out in the first few minutes' working and can be easily picked from the surface.

Cleaning Varnish Brushes.—Varnish brushes, and brushes used in varnish stain, buggy paint, and all color in varnish require different handling than paint brushes. They should be more thoroughly dry cleaned, in order that all loose hairs may be worked out. After working them through the hand it is a good thing to pass the brush back and forth over a sheet of sandpaper. This rough surface will pull out the loose bristles and smooth down the rough ends of the chisel point. The brush should then be washed by working it for a few minutes in clean turpentine and swinging it dry. It should never be put in water. For carriage work and fine varnishing the brush should be broken in on the rubbing coat in order to work out all the dust particles before it is used on the finishing coats.

Setting the Paint-Brush Bristles.—For the first 2 or 3 days new brushes require special care while at rest. They should be dipped in raw oil or the paint itself and smoothed out carefully, then laid on their sides over night. The chisel-pointed brushes should be set at an incline, the handle supported just enough to allow the brush to lie along the point. This is done to prevent twisting of the bristles, and to keep the shape of the brush. It is necessary to do this only 2 or 3 times before the shape becomes set.

Paint Brushes at Rest.—An important principle in brush care is never to leave the brush on end while at rest. Even for temporary rest during a job the brush should never stand on end. At night it should always be placed in a "brush-keeper"—a water-tight box, or a paint keg, with nails driven through the sides on which the brushes can be suspended in water. Holes are bored in the handles so the brush will hang free of the bottom, but with the bristles entirely under water. Before placing them in water the brushes should be wiped so as not to be too full of paint, but not cleaned.

Varnish Brushes at Rest.—Varnish brushes should be kept at rest in turpentine and varnish, or better, in some of the varnish that the brush is used for. They should preferably not be kept in turpentine, as that makes the brush "lousy"—roughening the bristles.

Washing Brushes.—All brushes should be washed in benzine or turpentine and shaken dry—not whipped—when it is desired to change from one color to another, or from one varnish to another.

To Restore Brushes.—A good remedy to restore lettering brushes which have lost their elasticity and do not keep a point, is as follows:

Put the pencil in oil and brush it several times over a hot iron in such a manner that the hairs touch the iron from each side; then dip the pencil quickly in cold water.

A Removable Binding.—The bristle bunch of brushes is bound with rope so as to keep them together for use. Instead of the twine, a covering of rubber may be employed, which is easily slipped over the bristles and can be conveniently removed again. The cleaning of the brush is much facilitated thereby, and the breadth of the stripe to be drawn with the brush can be accurately regulated, according to how far the covering is slipped over the brush.

See also Cleaning Preparations and Methods.

BUBBLES IN GELATIN:

See Gelatin.

BUBBLE (SOAP) LIQUID:

See Soap Bubble Liquid.

BUBBLES.

Bubbles of air often adhere to molds immersed in depositing solutions. They may be prevented by previously dipping the object into spirits of wine, or be removed by the aid of a soft brush, or by directing a powerful current of the liquid against them by means of a vulcanized india-rubber bladder, with a long and curved glass tube attached to it; but the liquid should be free from sediment.

BURN REMEDY:

Carron Oil.—Mix equal parts of lime water and raw linseed oil. Shake thoroughly. This forms a stable emulsion which can be used freely without any fear of injury.

BURNS:
See also Ointments and Turpentine.

Mixture for Burns.—I.—A mixture of castor oil with the white of egg is recommended for burns. The eggs are broken into a bowl and the castor oil slowly poured in while the eggs are beaten. Enough oil is added to make a thick, creamy paste, which is applied to the burn. The applications are repeated often enough to prevent their becoming dry or sticky. Leave the surface uncovered.

II.—Put 27 parts, by measure, of menthol into 44 parts, by measure, of witch hazel (distillate) and apply freely. A good plan is to bandage the parts and wet the wrappings with this mixture.

III.—A very efficacious remedy for burns is a solution of cooking salt in water. It is best to immerse fingers, hands, and arms in the solution, which must be tolerably strong. For burns in the face and other parts of the body, salt water poultices are applied.

Butter

(See also Foods.)

Butter Color.—Orlean, 80 parts, by weight; curcuma root (turmeric), 80 parts, by weight; olive oil, 240 parts, by weight; saffron, 1 part, by weight; alcohol, 5 parts, by weight. The orlean and turmeric are macerated with olive oil and expressed. The weight of the filtered liquid is made up again to 240 parts, by weight, with olive oil, next the filtered saffron-alcohol extract is added, and the alcohol is expelled again by heating the mixture.

Artificial Butter.—I.—Carefully washed beef suet furnishes a basis for the manufactures of an edible substitute for natural butter. The thoroughly washed and finely chopped suet is rendered in a steam-heated tank; 1,000 parts of fat, 300 parts of water, 1 part of potassium carbonate, and 2 stomachs of pigs or sheep, are taken. The temperature of the mixture is raised to 113° F. After 2 hours, under the influence of the pepsin in the stomachs, the membranes are dissolved and the fat is melted and rises to the top of the mixture. After the addition of a little salt the melted fat is drawn off, stood to cool so as to allow the stearine and palmitin to separate, and then pressed in bags in a hydraulic press. Forty to 50 per cent of solid stearine remains, while 50 to 60 per cent of fluid oleopalmitin (so-called "oleomargarine") is pressed out. The "oleo oil" is then mixed with 10 per cent of its weight of milk and a little butter color and churned. The product is then worked, salted, and constituted the "oleomargarine," or butter substitute. Leaf lard can be worked in the same way as beef suet, and will yield an oleopalmitin suitable for churning up into a butter substitute.

II.—Fat from freshly slaughtered cattle after thorough washing is placed in clean water and surrounded with ice, where it is allowed to remain until all animal heat has been removed. It is then cut into small pieces by machinery and cooked at a temperature of about 150° F. (65.6° C.) until the fat in liquid form has separated from the tissue, then settled until it is perfectly clear. Then it is drawn into the graining vats and allowed to stand for a day, when it is ready for the presses. The pressing extracts the stearine, leaving a product commercially known as oleo oil which, when churned with cream or milk, or both, and with usually a proportion of creamery butter, the whole being properly salted, gives the new food product, oleomargarine.

III.—In making butterine use neutral lard, which is made from selected leaf lard in a very similar manner to oleo oil, excepting that no stearine is extracted. This neutral lard is cured in salt brine for from 48 to 70 hours at an ice-water temperature. It is then taken and, with the desired proportion of oleo oil and fine butter, is churned with cream and milk, producing an article which when properly salted and packed is ready for the market. In both cases coloring matter is used, which is the same as that used by dairymen to color their butter. At certain seasons of the year—viz., in cold weather, a small quantity of sesame oil or salad oil made from cottonseed oil is used to soften the texture of the product.

IV.—"Ankara" is a substance which in general appearance resembles a good article of butter, being rather firmer at ordinary temperatures than that substance, approaching the consistency of cocoa butter. It is quite odorless, but in taste it resembles that of a fair article of butter and, what is more, its behavior under heat is very similar to that of butter—it browns and forms a sort of spume like that of fat. Ankara consists of a base of cocoa butter, carrying about 10 per cent of milk, colored with yolk of egg. While not derived from milk, on the one hand, nor does it come from a single vegetable or animal fat on the other, un-

kara may be considered as belonging to the category of the margarines. Ankara is obtained in the market in the form of cakes or tablets of 2 pounds in weight.

V.—Fresh butter, 150 parts, by weight; animal fat, 80 parts, by weight; sunflower oil, 40 parts, by weight; cocoanut oil, 30 parts, by weight.

VI.—Fresh butter, 100 parts, by weight; animal fat, 100 parts, by weight; sunflower oil, 80 parts, by weight; cocoanut oil, 20 parts, by weight.

VII.—Fresh butter, 50 parts, by weight; animal fat, 150 parts, by weight; sunflower oil, 80 parts, by weight; cocoanut oil, 20 parts, by weight.

It is seen that these three varieties contain respectively 50, 33, and about 16 per cent of cow's butter. The appearance of the mixture is nearly perfect.

Formulas V to VII are for a Russian artificial butter called "Perepusk."

To Impart the Aroma and Taste of Natural Butter to Margarine.—In order to give margarine the aroma and flavor of cow butter, add to it a fatty acid product, which is obtained by saponification of butter, decomposition of the soap, and distillation in the vacuum at about 140° F. The addition of the product is made upon emulsification of the fats with milk. The margarine will keep for months.

Harmless Butter Color.—Alum, pulverized finely, 30 parts; extract of turmeric, 1 part. With the extract dampen the powder as evenly as possible, then spread out and dry over some hot surface. When dry, again pulverize thoroughly. Protect the product from the light. As much of the powder as will lie on the point of a penknife is added to a churnful of milk, or cream, before churning, and it gives a beautiful golden color, entirely harmless. To make the extract of turmeric add 1 part of powdered turmeric to 5 parts of alcohol, and let macerate together for fully a week.

To Sweeten Rancid Butter.—I.—Wash the butter first with fresh milk and afterwards with spring water, carefully working out the residual water.

II.—Add 25 to 30 drops of lime chloride to every 2 pounds of butter, work the mass up thoroughly, then wash in plenty of fresh, cold water, and work out the residual water.

III.—Melt the butter in a water bath, along with some freshly burned animal charcoal, coarsely powdered and carefully sifted to free it from dust. After this has remained in contact for a few minutes, the butter is strained through a clean flannel. If the rancid odor is not completely removed, complete the process.

An English Margarine.—A mixture of edible fats of suitable consistency, e. g., oleo oil, 5 parts; neutral lard, 7 parts; and butter, 1 part; is mixed with albuminous "batter," 4 parts, with the addition of 1 part of salt as a preservative. If the albuminous constituent be composed of the whites and yolks of eggs beaten to a foam the product will have the consistency and color of butter. The molten fats are added to the egg batter and the whole is stirred at a temperature sufficient to produce coagulation of the albumen (150–200° F.). The mass is then cooled gradually with continuous stirring, and the salt is worked in.

Olive-Oil Paste.—If an ounce of peeled garlic be rubbed up into a pulp, in a clean Wedgwood mortar, and to this be added from 3 to 4 ounces of good olive oil, with constant rubbing up with the pestle, the oil becomes converted into a pasty mass, like butter. It is possible that the mucilage obtainable from other bulbs of the *Lilium* tribe would prove equally efficient in conferring semi-solidity on the oil, without imparting any strong smell. The above composition is largely used by the Spanish peasantry, instead of butter, which runs liquid in the Spanish summer. It is known as "aleoli." The more easily solidified portion of olive oil is stearine, and this may be cheaply prepared from mutton fat. If added, in certain proportions, to olive oil, it would certainly raise its melting point.

BUTTERMILK, ARTIFICIAL.

Buttermilk powder, 10 parts; vinegar, 1 part; syrup of buckthorn, 1 part. Dissolve the powder in the water and add the vinegar and syrup. The powder is prepared as follows: Sodium chloride, 50 parts; milk sugar, 100 parts; potassium nitrate, 5 parts; alum, 5 parts Mix.

BUTTER, ARTIFICIAL: TESTS FOR:

See Foods.

BUTTER COLORANT:

See Foods.

BUTTONS OF ARTIFICIAL AGATE:

See Agate.

CADMIUM ALLOYS:

See Alloys.

CALCIUM CARBIDE:

Preservation and Use of Calcium Carbide.—Calcium carbide is readily attacked by the air and the moisture contained in the generators and consequently decomposes during the storing, with formation of acetylene gas. Aside from the loss, this decomposition is also attended with dangers. One of the oldest methods of preservation is the saturation of the carbide with petroleum. In using such carbide a layer of petroleum forms on the surface of the water in the generator, which prevents the water from evaporating, thus limiting the subsequent generation of acetylene from the remaining carbide. Instead of petroleum many other substances have been proposed which answer the purpose equally well, e. g., toluol, oils, solid bodies, which previously have to be liquefied, such as stearine, paraffine, rosin, etc.

Of a different nature is a medium offered by Létang of Paris. He employs sugar or saccharine bodies to which he adds, if necessary, a little petroleum, turpentine, vaseline, or varnish of any kind, as well as chalk, limestone, talc, sulphur, or sand. The carbide is coated with this mixture. The saccharine substances dissolve in the generating water, and also have a dissolving action on the slaked lime, which is formed by the decomposition of the carbide which admits of its easy removal.

According to another process carbide is put on the market in such a shape that, without weighing, merely by counting or measuring one is in a position to use equivalent quantities for every charge. Gearing casts molten carbide in the shape of bars, and pours a layer of gelatin, glue, and water soluble varnish over the carbide bars. Others make shells containing a certain quantity of reduced carbide. For this ordinary and varnished pasteboard, wax paper, tinfoil, thin sheet zinc, and similar substances may be used which ward off atmospheric moisture, thus protecting the carbide from premature decomposition. Before use, the cartridge-like shell is pierced or cut open, so that the water can get at the contents. The more or less reduced carbide is filled in the shell, either without any admixture or united into a compact mass by a binding agent, such as colophony, pitch, tar, sand, etc.

Deodorization of Calcium Carbide.—Calcium carbide is known to possess a very unpleasant odor because it constantly develops small quantities of impure acetylene in contact with the moisture of the air. Le Roy, of Rouen, proposes for portable—especially bicycle—lamps, in which the evil is more noticeable than in large plants, simply to pour some petroleum over the carbide and to pour off the remainder not absorbed. The petroleum, to which it is well to add some nitro-benzol (mirbane essence), prevents the access of air to the carbide, but permits a very satisfactory generation of gas on admission of water.

CALLOUS SPOTS ON FEET:

To remove.—Soak feet for half an hour morning and night in a gallon of water in which has been dissolved a handful of sal soda.

CAMPHOR PREPARATIONS:

Fragrant Naphthalene Camphor.—

Naphthalene white, in scales	3,000 parts
Camphor	1,000 parts

Melt on the steam bath and add to the hot mass:

Coumarin	2 parts
Mirbane oil	10 parts

Cast in plates or compressed tablets. The preparation is employed as a moth preventive.

Powdered Camphor in Permanent Form.—I.—Powder the camphor in the usual manner, with the addition of a little alcohol. When it is nearly reduced to the proper degree of fineness add a few drops of fluid petrolatum and immediately triturate again. In this manner a powder as fine as flour is obtained, which does not cake together. This powdered camphor may be used for all purposes except for solution in alcohol, as it will impart to the latter a faint opalescence, owing to the insolubility of the petrolatum.

II.—Take equal parts of strong ether and alcohol to reduce the camphor to powder. It is claimed for this method that it only takes one-half of the time required when alcohol alone is used, and that the camphor dries more quickly. Before sifting add 1 per cent of white vaseline and 5 per cent of sugar of milk. Triturate fairly dry, spread out in the air, say 15 minutes, then pass through a moderately fine wire sieve, using a stubby shaving brush to assist in working it through.

Camphor Pomade —

Oil of bitter almonds	1	drachm
Oil of cloves	20	drops
Camphor	1½	ounces
White wax	4	ounces
Lard, prepared	1	pound

Melt the wax and lard together, then add the camphor in saturated solution in spirit; put in the oils when nearly cold.

Camphor Ice.—

I.—White wax	16	parts
Benzoated suet	48	parts
Camphor, powdered	8	parts
Essential oil, to perfume.		

Melt the wax and suet together. When nearly cold, add the camphor and perfume, mix well, and pour into molds.

II.—Oil of almond	16	parts
White wax	4	parts
Spermaceti	4	parts
Paraffine	8	parts
Camphor, powdered	1	part
Perfume, quantity sufficient.		

Dissolve the camphor in the oil by the aid of a gentle heat. Melt the solids together, remove, and let cool, but before the mixture begins to set add the camphorated oil and the perfume, mix, and pour into molds.

III.—Stearine (stearic acid)	8	pounds
Lard	10	pounds
White wax	5	pounds
Spermaceti	5	pounds

Melt on a water bath in an earthen or porcelain dish; strain into a similar vessel; add a solution of 2 ounces powdered borax in 1 pound of glycerine, previously warmed, to the melted substance when at the point of cooling; stir well; add camphor, 2 pounds, powdered by means of alcohol, 3 ounces; stir well and pour into molds.

CANVAS SHOES, TO CLEAN:

Soap cut in small pieces	½	ounce
Water	30	ounces
Alcohol	½	ounce
Soda	1	ounce
Liquid ammonia	½	ounce
Chalk	3	ounces

CANARY-BIRD PASTE.

The following is a formula much used by German canary-bird raisers:

Sweet almonds, blanched	16 parts
Pea meal	32 parts
Butter, fresh (unsalted)	3 parts
Honey, quantity sufficient to make a stiff paste.	

The ingredients are worked into a stiff paste, which is pressed through a colander or large sieve to granulate the mass. Some add to every 5 pounds, 10 or 15 grains of saffron and the yolks of 2 eggs.

CANARY BIRDS AND THEIR DISEASES:

See Veterinary Formulas.

CANDLES:

Coloring Ceresine Candles for the Christmas Tree.—For coloring these candles only dye stuffs soluble in oil can be employed. Blue: 23–24 lavender blue, pale or dark, 100–120 parts per 5,000 parts of ceresine. Violet: 26 fast violet R, 150 parts per 5,000 parts of ceresine. Silver gray: 29 silver gray, 150 parts per 5,000 parts of ceresine. Yellow and orange: 30 wax yellow, medium, 200 parts per 5,000 parts of ceresine; 61 old gold, 200 parts per 5,000 parts of ceresine. Pink and red: 27 peach-pink, or 29 chamois, about 100 parts per 5,000 parts of ceresine. Green: 16–17 brilliant green, 33 May green, 41 May green, 200–250 parts per 5,000 parts of ceresine. The above-named colors should be ground in oil and the ceresine tinted with them afterwards.

Manufacture of Composite Paraffine Candles.—Three parts of hydroxystearic acid are dissolved in 1 part of a suitable solvent (e. g., stearic acid), and the solution is mixed with paraffine wax to form a stock for the manufacture of composite candles.

Transparent Candles.—The following are two recipes given in a German patent specification. The figures denote parts by weight:

I.—Paraffine wax, 70; stearine, 15; petroleum, 15.

II.—Paraffine wax, 90; stearine, 5; petroleum, 5. Recipe I of course gives candles more transparent than does recipe II. The 15 per cent may be regarded as the extreme limit consistent with proper solidity of the candles.

To Prevent the Trickling of Burning Candles.—Dip the candles in the following mixture:

Magnesium sulphate	15 parts
Dextrin	15 parts
Water	100 parts

The solution dries quickly and does not affect the burning of the candle.

Candle Coloring.—Candles are colored either throughout or they sometimes consist of a white body that is covered with a colored layer of paraffine wax. According to the material from which candles are made (stearine, paraffine, or ozokerite), the process of coloring varies.

Stearine, owing to its acid character, dissolves the coal-tar colors much more readily than do the perfectly neutral paraffine and ozokerite waxes. For coloring stearine the necessary quantity of the color is added to the melted mass and well stirred in; if the solution effected happens to be incomplete, a small addition of alcohol will prove an effective remedy. It is also an advantage to dissolve the colors previously in alcohol and add the concentrated solution to the melted stearine. The alcohol soon evaporates, and has no injurious effect on the quality of the stearine.

For a number of years there have been on the market so-called "fat colors," formed by making concentrated solutions of the color, and also special preparations of the colors in stearine. They are more easily applied, and are, therefore, preferred to the powdered aniline colors, which are apt to cause trouble by being accidentally distributed in soluble particles, where they are not wanted. Since paraffine and ozokerite dissolve comparatively little, they will not become colored, and so must be colored indirectly. One way is to dissolve the color in oleic acid or in stearine acid and add the solution to the wax to be colored. Turpentine may be employed for the same purpose. Concerning the colors suitable for candles, there are the eosine colors previously mentioned, and also chroline yellow, auramine, taniline blue, tartrazine, brilliant green, etc. The latter, however, bleaches so rapidly that it can hardly be recommended. An interesting phenomenon is the change some colors undergo in a warm temperature; for instance, some blues turn red at a moderate degree of heat (120° F.) and return to blue only when completely cooled off; this will be noticed while the candle mixture is being melted previous to molding into candles.

CANDY KISSES:

5 pounds of sugar
5 pounds of glucose
1 quart of water
Teaspoonful cream of tartar

Add a pinch of salt, place in a deep pan, boil until a little dropped in cold water turns hard. Take off the fire and pour on a table of marble which has been previously greased, and with a knife or spatula, turn several times or until sufficiently cool to pull on a hook. When it begins to harden, take down and roll into strips about one inch thick and cut with scissors to the desired size and wrap in waxed paper of different colors. Different flavors can be made by using a little cocoa, grated lemon or orange peel chopped, dried fruits, etc.

CARAMEL:

Cloudless Caramel Coloring.—I.—When it is perfectly understood that in the manufacture of caramel, sugar is to be deprived of the one molecule of its water of constitution, it will be apparent that heat must not be carried on to the point of carbonization. Cloudy caramel is due to the fact that part of the sugar has been dissociated and reduced to carbon, which is insoluble in water. Hence the cloudiness. Caramel may be made on a small scale in the following manner: Place 4 or 5 ounces of granulated sugar in a shallow porcelain-lined evaporating dish and apply either a direct heat or that of an oil bath, continuing the heat until caramelization takes place or until tumescence ceases and the mass has assumed a dark-brown color. Then carefully add sufficient water to bring the viscid mass to the consistence of a heavy syrup. Extreme *care* must be taken and the face and hands protected during the addition of the water, owing to the intensity of the heat of the mass, and consequent sputtering.

II.—The ordinary sugar coloring material is made from sugar or glucose by heating it, while being constantly stirred, up to a temperature of about 405° F. A metal pan capable of holding nearly ten times as much as the sugar used, is necessary so as to retain the mass in its swollen condition. As soon as it froths up so as nearly to fill the pan, an action which occurs suddenly, the fire must instantly be extinguished or removed. The finished product will be insoluble if more than about 15 per cent of its weight is driven off by the heat.

CARAMEL IN FOOD:

See Food.

CARAMELS:

See Confectionery.

CARBOLIC ACID.

Perfumed Carbolic Acid.—

I.—Carbolic acid (cryst.)	1	ounce
Alcohol	1	ounce
Oil bergamot	10	minims
Oil eucalyptus	10	minims
Oil citronella	3	minims
Tincture cudbear	10	minims
Water, to make	10	ounces

Set aside for several days, and then filter through fuller's earth.

II.—Carbolic acid (cryst.)	4	drachms
Cologne water	4	drachms
Dilute acetic acid	9	ounces

Keep in a cool place for a few days, and filter.

Treatment of Carbolic-Acid Burns.—Thoroughly wash the hands with alcohol, and the burning and tingling will almost immediately cease. Unless employed immediately, however, the alcohol has no effect. When the time elapsed since the burning is too great for alcohol to be of value, brush the burns with a saturated solution of picric acid in water.

Decolorization of Carbolic Acid.—To decolorize the acid the following simple method is recommended. For purifying carbolic acid which has already become quite brown-red on account of having been kept in a tin vessel, the receptacle is exposed for a short time to a temperature of 25° C. (77° F.), thus causing only a part of the contents to melt. In this state the acid is put into glass funnels and left to stand for 10 to 12 days in a room which is likewise kept at the above temperature. Clear white crystals form from the drippings, which remained unchanged, protected from air and light, while by repeating the same process more clear crystals are obtained from the solidified dark colored mother lye. In this manner 75 to 80 per cent of clear product is obtained altogether.

Disguising Odor of Carbolic Acid.—Any stronger smelling substance will disguise the odor of carbolic acid, to an extent at least, but it is a difficult odor to disguise on account of its persistence. Camphor and some of the volatile oils, such as peppermint, cajeput, caraway, clove, and wintergreen may be used.

To Restore Reddened Carbolic Acid.—Demont's method consists in melting the acid on the water bath, adding 12 per cent of alcohol of 95 per cent, letting cool down and, after the greater part of the substance has crystallized out, decanting the liquid residue. The crystals obtained in this manner are snowy white, and on being melted yield a nearly colorless liquid. The alcohol may be recovered by redistillation at a low temperature. This is a rather costly procedure.

CARBOLIC SOAP:

See Soap.

CARBOLINEUM:

See also Paints and Wood.

Preparation of Carbolineum.—I.—Melt together 50 parts of American rosin (F) and 150 parts of pale paraffine oil (yellow oil), and add, with stirring, 20 parts of rosin oil (rectified).

II.—Sixty parts, by weight, of black coal tar oil of a specific gravity higher than 1.10; 25 parts, by weight, of creosote oil; 25 parts, by weight, of beechwood tar oil of a higher specific weight than 0.9. Mix together and heat to about 347° F., or until the fumes given off begin to deposit soot. The resulting carbolineum is brown, and of somewhat thick consistency; when cool it is ready for use and is packed in casks. This improved carbolineum is applied to wood or masonry with a brush; the surfaces treated dry quickly, very soon loose the odor of the carbolineum, and are effectively protected from dampness and formation of fungi.

CARBON PRINTING:

See Photography.

CARBON PROCESS IN PHOTOGRAPHY:

See Photography.

CARBONYLE:

See Wood.

CARBUNCLE REMEDIES:

See Boil Remedy.

CARDS (PLAYING), TO CLEAN:

See Cleaning Preparations and Methods.

CARDBOARD, WATERPROOF GLUE FOR:

See Adhesives under Cements and Waterproof Glues.

CARDBOARD, WATERPROOFING:

See Waterproofing.

CARMINATIVES:

See Pain Killers.

CARPET PRESERVATION:

See Household Formulas.

CARPET SOAP:

See Soap.

CARRIAGE-TOP DRESSING:
See Leather.

CARRON OIL:
See Cosmetics.

CASE HARDENING:
See Steel.

Casein

Dried Casein, its Manufacture and Uses.—For the production of casein, skimmed milk or buttermilk is used, articles of slight value, as they cannot be employed for feeding hogs or for making cheese, except of a very inferior sort, of little or no alimentive qualities. This milk is heated to from 70° to 90° C. (175°–195° F.), and sulphuric or hydrochloric acid is added until it no longer causes precipitation. The precipitate is washed to free it from residual lactose, redissolved in a sodium carbonate solution, and again precipitated, this time by lactic acid. It is again washed, dried, and pulverized. It takes 8 gallons of skimmed milk to make 1 pound of dry casein.

In the manufacture of fancy papers, or papers that are made to imitate the appearance of various cloths, laces, and silks, casein is very widely used. It is also largely used in waterproofing tissues, for preparation of waterproof products, and various articles prepared from agglomeration of cork (packing boards, etc.). With lime water casein makes a glue that resists heat, steam, etc. It also enters into the manufacture of the various articles made from artificial ivory (billiard balls, combs, toilet boxes, etc.), imitation of celluloid, meerschaum, etc., and is finding new uses every day.

Casein, as known, may act the part of an acid and combine with bases to form caseinates or caseates; among these compounds, caseinates of potash, of soda, and of ammonia are the only ones soluble in water; all the others are insoluble and may be readily prepared by double decomposition. Thus, for example, to obtain caseinate of alumina it is sufficient to add to a solution of casein in caustic soda, a solution of sulphate of alumina; an insoluble precipitate of casein, or caseinate of alumina, is instantly formed.

This precipitate ought to be freed from the sulphate of soda (formed by double decomposition), by means of prolonged washing. Pure, ordinary cellulose may be incorporated with it by this process, producing a new compound, cheaper than pure cellulose, although possessing the same properties, and capable of replacing it in all its applications.

According to the results desired, in transparency, color, hardness, etc., the most suitable caseinate should be selected. Thus, if a translucent compound is to be obtained, the caseinate of alumina yields the best. If a white compound is desired, the caseinate of zinc, or of magnesia, should be chosen; and for colored products the caseinates of iron, copper, and nickel will give varied tints.

The process employed for the new products, with a base of celluloid and caseinate, is as follows: On one hand casein is dissolved in a solution of caustic soda (100 parts of water for 10 to 25 parts of soda), and this liquid is filtered to separate the matters not dissolved and the impurities. On the other hand, a salt of the base of which the caseinate is desired is dissolved, and the solution filtered. It is well not to operate on too concentrated a solution. The two solutions are mixed in a receptacle provided with a mechanical stirrer, in order to obtain the insoluble caseinate precipitate in as finely divided a state as possible. This precipitate should be washed thoroughly, so as to free it from the soda salt formed by double decomposition, but on account of its gummy or pasty state, this washing presents certain difficulties, and should be done carefully. After the washing the mass is freed from the greater part of water contained, by draining, followed by drying, or energetic pressing; then it is washed in alcohol, dried or pressed again, and is ready to be incorporated in the plastic mass of the celluloid.

For the latter immersion and washing it has been found that an addition of 1 to 5 per cent of borax is advantageous, for it renders the mass more plastic, and facilitates the operation of mixing. This may be conducted in a mixing apparatus; but, in practice, it is found preferable to effect it with a rolling mill, operating as follows:

The nitro-cellulose is introduced in the plastic state, and moistened with a solution of camphor in alcohol (40 to 50 parts of camphor in 50 to 70 of alcohol for 100 of nitro-cellulose) as it is practiced in celluloid factories.

This plastic mass of nitro-cellulose is placed in a rolling mill, the cylinders of which are slightly heated at the same time as the caseinate, prepared as above; then the whole mass is worked by the cylinders until the mixture of the two

is perfectly homogeneous, and the final mass is sufficiently hard to be drawn out in leaves in the same way as practiced for pure celluloid.

These leaves are placed in hydraulic presses, where they are compressed, first hot, then cold, and the block thus formed is afterwards cut into leaves of the thickness desired. These leaves are dried in an apparatus in the same way as ordinary celluloid. The product resembles celluloid, and has all its properties. At 90° to 100° C. (194° to 212° F.), it becomes quite plastic, and is easily molded. It may be sawed, filed, turned, and carved without difficulty, and takes on a superb polish. It burns less readily than celluloid, and its combustibility diminishes in proportion as the percentage of caseinate increases; finally, the cost price is less than that of celluloid, and by using a large proportion of caseinate, products may be manufactured at an extremely low cost.

Phosphate of Casein and its Production.—The process is designed to produce a strongly acid compound of phosphoric acid and casein, practically stable and not hydroscopic, which may be employed as an acid ingredient in bakers' yeast and for other purposes.

The phosphoric acid may be obtained by any convenient method; for example, by decomposing dicalcic or monocalcic phosphate with sulphuric acid. The commercial phosphoric acid may also be employed.

The casein may be precipitated from the skimmed milk by means of a suitable acid, and should be washed with cold water to remove impurities. A caseinate may also be employed, such as a compound of casein and an alkali or an alkaline earth.

The new compound is produced in the following way: A sufficient quantity of phosphoric acid is incorporated with the casein or a caseinate in such a way as to insure sufficient acidity in the resulting compound. The employment of 23 to 25 parts by weight of phosphoric acid with 75 to 77 parts of casein constitutes a good proportion.

An aqueous solution of phosphoric acid is made, and the casein introduced in the proportion of 25 to 50 per cent of the weight of the phosphoric acid present. The mixture is then heated till the curdled form of the casein disappears, and it assumes a uniform fluid form. Then the mixture is concentrated to a syrupy consistency. The remainder of the casein or of the caseinate is added and mixed with the solution until it is intimately incorporated and the mass becomes uniform. The compound is dried in a current of hot air, or in any other way that will not discolor it, and it is ground to a fine powder. The intimate union of the phosphoric acid and casein during the gradual concentration of the mixture and during the grinding and drying, removes the hydroscopic property of the phosphoric acid, and produces a dry and stable product, which may be regarded as a hyperphosphate of casein. When it is mixed with water, it swells and dissolves slowly. When this compound is mingled with its equivalent of sodium bicarbonate it yields about 17 per cent of gas.

CASEIN CEMENTS:
See Adhesives.

CASEIN VARNISH:
See Varnishes.

CASKS:

To Render Shrunken Wooden Casks Watertight.—When a wooden receptacle has dried up it naturally cannot hold the water poured into it for the purpose of swelling it, and the pouring has to be repeated many times before the desired end is reached. A much quicker way is to stuff the receptacle full of straw or bad hay, laying a stone on top and then filling the vessel with water. Although the water runs off again, the moistened straw remains behind and greatly assists the swelling up of the wood.

CASSIUS, PURPLE OF:
See Gold.

CASKET TRIMMINGS:
See Castings.

CASTS (PLASTER), PRESERVATION OF:
See Plaster.

CASTS, REPAIRING OF BROKEN:
See Adhesives and Lutes.

CASTS FROM WAX MODELS:
See Modeling.

Casting

Castings Out of Various Metals.—Until recent years metal castings were all made in sand molds; that is, the patterns were used for the impressions in the sand, the same as iron castings are produced to-day. Nearly all of the softer metals are now cast in brass, copper, zinc, or iron molds, and only the silver

and German silver articles, like wire real bronze, are cast the old way, in sand. Aluminum can be readily cast in iron molds, especially if the molds have been previously heated to nearly the same temperature as the molten aluminum, and after the molds are full the metal is cooled gradually and the casting taken out as soon as cooled enough to prevent breaking from the shrinkage. Large bicycle frames have been successfully cast in this manner.

The French bronzes, which are imitations, are cast in copper or brass molds. The material used is principally zinc and tin, and an unlimited number of castings can be made in the mold, but if a real bronze piece is to be produced it must be out of copper and the mold made in sand. To make the castings hollow, with sand, a core is required. This fills the inside of the figure so that the molten copper runs around it, and as the core is made out of sand, the same can be afterwards washed out. If the casting is to be hollow and is to be cast in a metal mold, then the process is very simple. The mold is filled with molten metal, and when the operator thinks the desired thickness has cooled next to the walls, he pours out the balance. An experienced man can make hollow castings in this way, and make the walls of any thickness.

Casket hardware trimmings, which are so extensively used on coffins, especially the handles, are nearly all cast out of tin and antimony, and in brass molds. The metal used is brittle, and requires strengthening at the weak portions, and this is mostly done with wood filling or with iron rods, which are secured in the molds before the metal is poured in.

Aluminum castings, which one has procured at the foundries, are usually alloyed with zinc. This has a close affinity with aluminum, and alloys readily; but this mixture is a detriment and causes much trouble afterwards. While this alloy assists the molder to produce his castings easily, on the other hand it will not polish well and will corrode in a short time. Those difficulties may be avoided if pure aluminum is used.

Plaster of Paris molds are the easiest made for pieces where only a few castings are wanted. The only difficulty is that it requires a few days to dry the plaster thoroughly, and that is absolutely necessary to use them successfully. Not only can the softer metals be run into plaster molds, but gold and silver can be run into them. A plaster mold should be well smoked over a gaslight, or until well covered with a layer of soot, and the metal should be poured in as cool a state as it will run.

To Prevent the Adhesion of Modeling Sand to Castings.—Use a mixture of finely ground coke and graphite. Although the former material is highly porous, possessing this quality even as a fine powder, and the fine pulverization is a difficult operation, still the invention attains its purpose of producing an absolutely smooth surface. This is accomplished by mixing both substances intimately and adding melted rosin, whereupon the whole mass is exposed to heat, so that the rosin decomposes, its carbon residue filling up the finest pores of the coke. The rosin, in melting, carries the fine graphite particles along into the pores. After cooling the mass is first ground in edge mills, then again in a suitable manner and sifted. Surprising results are obtained with this material. It is advisable to take proportionately little graphite, as the different co-efficients of expansion of the two substances may easily exercise a disturbing action. One-fifth of graphite, in respect to the whole mass, gives the best results, but it is advisable to add plenty of rosin. The liquid mixture must, before burning, possess the consistency of mortar.

Sand Holes in Cast-Brass Work.—Cast-brass work, when it presents numerous and deep sand holes, should be well dipped into the dipping acid before being polished, in order thoroughly to clean these objectionable cavities; and the polishing should be pushed to an extent sufficient to obliterate the smaller sand holes, if possible, as this class of work looks very unsightly, when plated and finished, if pitted all over with minute hollows. The larger holes cannot, without considerable labor, be obliterated; indeed, it not infrequently happens that in endeavoring to work out such cavities they become enlarged, as they often extend deep into the body of the metal. An experienced hand knows how far he dare go in polishing work of this awkward character.

Black Wash for Casting Molds.—Gumlac, 1 part; wood spirit, 2 parts; lampblack, in sufficient quantity to color.

How to Make a Plaster Cast of a Coin or Medal.—The most exact observance of any written or printed directions is no guarantee of success. Practice alone can give expertness in this work.

The composition of the mold is of the most varied, but the materials most generally used are plaster of Paris and brick dust, in the proportion of 2 parts of the first to 1 of the second, stirred in water, with the addition of a little sal ammoniac. The best quality of plaster for this purpose is the so-called alabaster, and the brick dust should be as finely powdered as possible. The addition of clay, dried and very finely powdered, is recommended. With very delicate objects the proportion of plaster may be slightly increased. The dry material should be thoroughly mixed before the addition of water.

As the geometrically exact contour of the coin or medal is often the cause of breaking of the edges, the operator sometimes uses wax to make the edges appear half round and it also allows the casting to be more easily removed from the second half of the mold. Each half of the mold should be about the thickness of the finger. The keys, so called, of every plaster casting must not be forgotten. In the first casting some little half-spherical cavities should be scooped out, which will appear in the second half-round knobs, and which, by engaging with the depressions, will ensure exactness in the finished mold.

After the plaster has set, cut a canal for the flow of the molten casting material, then dry the mold thoroughly in an oven strongly heated. The halves are now ready to be bound together with a light wire. When bound heat the mold gradually and slowly and let the mouth of the canal remain underneath while the heating is in progress, in order to prevent the possible entry of dirt or foreign matter. The heating should be continued as long as there is a suspicion of remaining moisture. When finally assured of this fact, take out the mold, open it, and blow it out, to make sure of absolute cleanness. Close and bind again and place on a hearth of fine, hot sand. The mold should still be glowing when the casting is made. The ladle should contain plenty of metal, so as to hold the heat while the casting is being made. The presence of a little zinc in the metal ensures a sharp casting. Finally, to ensure success, it is always better to provide two molds in case of accident. Even the most practiced metal molders take this precaution, especially when casting delicate objects.

How to Make Castings of Insects.—The object—a dead beetle, for example—is first arranged in a natural position, and the feet are connected with an oval rim of wax. It is then fixed in the center of a paper or wooden box by means of pieces of fine wire, so that it is perfectly free, and thicker wires are run from the sides of the box to the object, which subsequently serve to form air channels in the mold by their removal. A wooden stick, tapering toward the bottom, is placed upon the back of the insect to produce a runner for casting. The box is then filled up with a paste with 3 parts of plaster of Paris and 1 of brick dust, made up with a solution of alum and sal ammoniac. It is also well first to brush the object with this paste to prevent the formation of air bubbles. After the mold thus formed has set, the object is removed from the interior by first reducing it to ashes. It is, therefore, allowed to dry, very slowly at first, by leaving in the shade at a normal temperature (as in India this is much higher than in our zone, it will be necessary to place the mold in a moderately warm place), and afterwards heating gradually to a red heat. This incinerates the object, and melts the waxen base upon which it is placed. The latter escapes, and is burned as it does so, and the object, reduced to fine ashes, is removed through the wire holes as suggested above. The casting is then made in the ordinary manner.

Casting of Soft Metal Castings.—I.—It is often difficult to form flat back or half castings out of the softer metals so that they will run full, owing mostly to the thin edges and frail connections. Instead of using solid metal backs for the molds it is better to use cardboard, or heavy, smooth paper, fastened to a wooden board fitted to the back of the other half of the mold. By this means very thin castings may be produced that would be more difficult with a solid metal back.

II.—To obtain a full casting in brass molds for soft metal two important points should be observed. One is to have the deep recesses vented so the air will escape, and the other is to have the mold properly blued. The bluing is best done by dipping the mold in sulphuric acid, then placing it on a gas stove until the mold is a dark color. Unless this bluing is done it will be impossible to obtain a sharp casting.

Drosses.—All the softer grades of metal throw off considerable dross, which is usually skimmed off; especially with tin and its composition. Should much of this gather on the top of the molten

metal, the drosses should all be saved, and melted down when there is enough for a kettle full. Dross may be remelted five or six times before all the good metal is out.

Fuel.—Where a good soft coal can be had at a low price, as in the middle West, this is perhaps the cheapest and easiest fuel to use; and, besides, it has some advantages over gas, which is so much used in the East. A soft-coal fire can be regulated to keep the metal at an even temperature, and it is especially handy to keep the metal in a molten state during the noon hour. This refers particularly to the gas furnaces that are operated from the power plant in the shop; when this power shuts down during the noon hour the metal becomes chilled, and much time is lost by the remelting after one o'clock, or at the beginning in the morning.

Molds.—I.—Brass molds for the casting of soft metal ornaments out of britannia, pewter, spelter, etc., should be made out of brass that contains enough zinc to produce a light-colored brass. While this hard brass is more difficult for the mold maker to cut, the superiority over the dark red copper-colored brass is that it will stand more heat and rougher usage and thereby offset the extra labor of cutting the hard brass. The mold should be heavy enough to retain sufficient heat while the worker is removing a finished casting from the mold so that the next pouring will come full. If the mold is too light it cools more quickly, and consequently the castings are chilled and will not run full. Where the molds are heavy enough they will admit the use of a swab and water after each pouring. This chills the casting so that it can be removed easily with the plyers.

II.—Molds for the use of soft metal castings may be made out of soft metal. This is done with articles that are not numerous, or not often used; and may be looked upon as temporary. The molds are made in part the same as when of brass, and out of tin that contains as much hardening as possible. The hardening consists of antimony and copper. This metal mold must be painted over several times with Spanish red, which tends to prevent the metal from melting. The metal must not be used too hot, otherwise it will melt the mold. By a little careful manipulation many pieces can be cast with these molds.

III.—New iron or brass molds must be blued before they can be used for casting purposes. This is done by placing the mold face downward on a charcoal fire, or by swabbing with sulphuric acid, then placing over a gas flame or charcoal fire until the mold is perfectly oxidized.

IV.—A good substantial mold for small castings of soft metal is made of brass. The expense of making the cast mold is considerable, however, and, on that account, some manufacturers are making their molds by electro-deposition. This produces a much cheaper mold, which can be made very quickly. The electro-deposited mold, however, is very frail in comparison with a brass casting, and consequently must be handled very carefully to keep its shape. The electro-deposited ones are made out of copper, and the backs filled in with a softer metal. The handles are secured with screws.

Plaster Molds.—Castings of any metal can be done in a plaster mold, provided the mold has dried, at a moderate heat, for several days. Smoke the mold well with a brand of rosin to insure a full cast. Where there are only one or two ornaments or figures to cast, it may be done in a mold made out of dental plaster. After the mold is made and set enough so that it can be taken apart, it should be placed in a warm place and left to dry for a day or two. When ready to use the inside should be well smoked over a gaslight; the mold should be well warmed and the metal must not be too hot. Very good castings may be obtained this way; the only objection being the length of time needed for a thorough drying of the mold.

Temperature of Metal.—Metals for casting purposes should not be overheated. If any of the softer metals show blue colors after cooling it is an indication that the metal is too hot. The metal should be heated enough so that it can be poured, and the finished casting have a bright, clean appearance. The mold may be very warm, then the metal need not be so hot for bright, clean castings. Some of the metals will not stand reheating too often, as this will cause them to run sluggish. Britannia metal should not be skimmed or stirred too much, otherwise there will be too much loss in the dross.

CASTING IN WAX:
See Modeling.

CASTINGS, TO SOFTEN IRON:
See Iron.

CASTOR OIL:

Purifying Rancid Castor Oil.—To clean rancid castor oil mix 100 parts of the oil at 95° F. with a mixture of 1 part of alcohol (96 per cent) and 1 part of sulphuric acid. Allow to settle for 24 hours and then carefully decant from the precipitate. Now wash with warm water, boiling for ½ hour; allow to settle for 24 hours in well closed vessels, after which time the purified oil may be taken off.

How to Pour Out Castor Oil.—Any one who has tried to pour castor oil from a square, 5-gallon can, when it is full, knows how difficult it is to avoid a mess. This, however, may be avoided by having a hole punched in the cap which screws onto the can, and a tube, 2 inches long and ¾ of an inch in diameter, soldered on. With a wire nail a hole is punched in the top of the can between the screw cap and the edge of the can. This will admit air while pouring. Resting the can on a table, with the screw-cap tube to the rear, the can is carefully tilted forward with one hand and the shop bottle held in the other. In this way the bottle may be filled without spilling any of the oil and that, too, without a funnel. It is preferable to rest the can on a table when pouring from a 1- or 2-gallon square varnish can, when filling shop bottles. With the opening to the rear, the can is likewise tilted forward slowly so as to allow the surface of the liquid to become "at rest." Even mobile liquids, such as spirits of turpentine, may be poured into shop bottles without a funnel. Of course, the main thing is that the can be lowered slowly, otherwise the first portion may spurt out over the bottle. With 5-gallon round cans it is possible to fill shop bottles in the same manner by resting the can on a box or counter. When a funnel is used for non-greasy liquids, the funnel may be slightly raised with the thumb and little finger from the neck of the bottle, while holding the bottle by the neck between the middle and ring fingers, to allow egress of air.

Tasteless Castor Oil.—

I.—

Pure castor oil	1 pint
Cologne spirit	3 fluidounces
Oil of wintergreen	40 minims
Oil of sassafras	20 minims
Oil of anise	15 minims
Saccharine	5 grains
Hot water, a sufficient quantity.	

Place the castor oil in a gallon bottle. Add a pint of hot water and shake vigorously for about 15 minutes. Then pour the mixture into a vessel with a stopcock at its base, and allow the mixture to stand for 12 hours. Draw off the oil, excepting the last portion, which must be rejected. Dissolve the essential oils and saccharine in the cologne spirit and add to the washed castor oil.

II.—First prepare an aromatic solution of saccharine as follows:

Refined saccharine	25 parts
Vanillin	5 parts
Absolute alcohol	950 parts
Oil of cinnamon	20 parts

Dissolve the saccharine and vanillin in the alcohol, then add the cinnamon oil, agitate well and filter. Of this liquid add 20 parts to 980 parts of castor oil and mix by agitation. Castor oil, like cod-liver oil, may be rendered nearly tasteless, it is claimed, by treating it as follows: Into a matrass of suitable size put 50 parts of freshly roasted coffee, ground as fine as possible, and 25 parts of purified and freshly prepared bone or ivory black. Pour over the mass 1,000 parts of the oil to be deodorized and rendered tasteless, and mix. Cork the container tightly, put on a water bath, and raise the temperature to about 140° F. Keep at this heat from 15 to 20 minutes, then let cool down, slowly, to 90°, at which temperature let stand for 3 hours. Finally filter, and put up in small, well-stoppered bottles.

III.—

Vanillin	3 grains
Garantose	4 grains
Ol. menth. pip.	8 minims
Alcoholis	3 drachms
Ol. ricinus	12 ounces
Ol. olivæ (imported), quantity sufficient	1 pint

M. ft. sol.

Mix vanillin, garantose, ol. menth. pip. with alcohol and add castor oil and olive oil.

Dose: One drachm to 2 fluidounces.

IV.—The following keeps well:

Castor oil	24 parts
Glycerine	24 parts
Tincture of orange peel	8 parts
Tincture of senega	2 parts
Cinnamon water enough to make	100 parts

Mix and make an emulsion. Dose is 1 tablespoonful.

V.—One part of common cooking molasses to 2 of castor oil is the best di-

guise for the taste of the oil that can be used.

VI.—Castor oil.....	1½	ounces
Powdered acacia..	2	drachms
Sugar.....	2	drachms
Peppermint water.	4	ounces

Triturate the sugar and acacia, adding the oil gradually; when these have been thoroughly incorporated add the peppermint water in small portions, triturating the mixture until an emulsion is formed.

VII.—This formula for an emulsion is said to yield a fairly satisfactory product:

Castor oil.....	500 c.c.
Mucilage of acacia	125 c.c.
Spirit of gaultheria	10 grams
Sugar.....	1 gram
Sodium bicarbonate.	1 gram

VIII.—Castor oil.....	1 ounce
Compound tincture of cardamom.....	4 drachms
Oil of wintergreen	3 drops
Powdered acacia..	3 drachms
Sugar.....	2 drachms
Cinnamon water	enough to make 4 ounces.

IX.—Castor oil.....	12 ounces
Vanillin.....	3 grains
Saccharine.....	4 grains
Oil of peppermint.	8 minims
Alcohol.....	3 drachms
Olive oil enough to make	1 pint.

In any case, use only a fresh oil.

How to Take Castor Oil.—The disgust for castor oil is due to the odor, not to the taste. If the patient grips the nostrils firmly before pouring out the dose, drinks the oil complacently, and then thoroughly cleanses the mouth, lips, larynx, etc., with water, removing the last vestige of the oil before removing the fingers, he will not get the least taste from the oil, which is bland and tasteless. It all depends upon preventing any oil from entering the nose during the time while there is any oil present.

Castor-Oil Chocolate Lozenges.—

Cacao, free from oil.	250 parts
Castor oil.....	250 parts
Sugar, pulverized...	500 parts
Vanillin sugar.....	5 parts

Mix the chocolate and oil and heat in the water, both under constant stirring. Have the sugar well dried and add, stirring constantly, to the molten mass. Continue the heat for 30 minutes, then pour out and divide into lozenges in the usual way.

CAT DISEASES AND THEIR REMEDIES: See Insecticides and Veterinary Formulas.

CATATYPY.

It is a well-known fact that the reactions of the compounds of silver, platinum, and chromium in photographic processes are generally voluntary ones and that the light really acts only as an accelerator, that is to say the chemical properties of the preparations also change in the dark, though a longer time is required. When these preparations are exposed to the light under a negative, the modification of their chemical properties is accelerated in such a way that, through the gradations of the tone-values in the negative, the positive print is formed. Now it has been found that we also have such accelerators in material substances that can be used in the light, the process being termed catalysis. It is remarkable that these substances, called catalyzers, apparently do not take part in the process, but bring about merely by their presence, decomposition or combination of other bodies during or upon contact. Hence, catalysis may be defined, in short, as the act of changing or accelerating the speed of a chemical reaction by means of agents which appear to remain stable.

Professor Ostwald and Dr. O. Gros, of the Leipsic University, have given the name of "catatypy" to the new copying process. The use of light is entirely done away with, except that for the sake of convenience the manipulations are executed in the light. All that is necessary is to bring paper and negative into contact, no matter whether in the light or in the dark. Hence the negative (if necessary a positive may also be employed) need not even be transparent, for the ascending and descending action of the tone values in the positive picture is produced only by the quantity in the varying density of the silver powder contained in the negative. Hence no photographic (light) picture, but a catatypic picture (produced by contact) is created, but the final result is the same.

Catatypy is carried out as follows: Pour dioxide of hydrogen over the negative, which can be done without any damage to the latter, and lay a piece of paper on (sized or unsized, rough or smooth, according to the effect desired); by a contact lasting a few seconds the paper receives the picture, dioxide of hydrogen being destroyed. From a single application several prints can be made. The acquired picture—still in-

visible—may now in the further course of the process, have a reducing or oxydizing action. As picture-producing bodies, the large group of iron salts are above all eminently adapted, but other substances, such as chromium, manganese, etc., as well as pigments with glue solutions may also be employed. The development takes place as follows: When the paper which has been in contact with the negative is drawn through a solution of ferrous oxide, the protoxide is transformed into oxide by the peroxide, hence a yellow positive picture, consisting of iron oxide, results, which can be readily changed into other compounds, so that the most varying tones of color can be obtained. With the use of pigments, in conjunction with a glue solution, the action is as follows: In the places where the picture is, the layer with the pigments becomes insoluble and all other dye stuffs can be washed off with water.

The chemical inks and reductions, as well as color pigments, of which the pictures consist, have been carefully tested and are composed of such as are known to possess unlimited durability.

After a short contact, simply immerse the picture in the respective solution, wash out, and a permanent picture is obtained.

CATERPILLAR DESTROYERS:
See Insecticides.

CATGUT:

Preparation of Catgut Sutures.—The catgut is stretched tightly over a glass plate tanned in 5 per cent watery extract of quebracho, washed for a short time in water, subjected to the action of a 4 per cent formalin solution for 24 to 48 hours, washed in running water for 24 hours, boiled in water for 10 to 15 minutes, and stored in a mixture of absolute alcohol with 5 per cent glycerine and 4 per cent carbolic acid. In experiments on dogs, this suture material in aseptic wounds remained intact for 65 days, and was absorbed after 83 days. In infected wounds it was absorbed after 32 days.

CATSUP (ADULTERATED):
See Foods.

CATTLE DIPS AND APPLICATIONS:
See Disinfectants and Insecticides.

CEILING CLEANERS:
See Cleaning Preparations and Methods, and also Household Formulas.

CELERY COMPOUND.

Celery (seed ground)	25	parts
Coca leaves (ground)	25	parts
Black haw (ground)	25	parts
Hyoscyamus leaves (ground)	12½	parts
Podophyllum (powdered)	10	parts
Orange peel (ground)	6	parts
Sugar (granulated)	100	parts
Alcohol	150	parts
Water, q. s. ad	400	parts

Mix the alcohol with 150 parts of water and macerate drugs for 24 hours; pack in percolator and pour on menstruum till 340 parts is obtained; dissolve sugar in it and strain.

CELLOPHANE ADHESIVE:

Acacia	18 parts
Glycerine	30 parts
Water	52 parts

Soak the gum overnight in the water. Then strain and add the glycerine.

CELLOIDIN PAPER:
See Paper.

Celluloid

New Celluloid.—M. Ortmann has ascertained that turpentine produced by the *Pinus larix*, generally denominated Venice turpentine, in combination with acetone (dimethyl ketone), yields the best results; but other turpentines, such as the American from the *Pinus australis*, the Canada turpentine from the *Pinus balsamea*, the French turpentine from the *Pinus maritima*, and ketones, such as the ketone of methyl-ethyl, the ketone of dinaphthyl, the ketone of methyl-oxynaphthyl, and the ketone of dioxy-naphthyl, may be employed.

To put this process in practice, 1,000 parts of pyroxyline is prepared in the usual manner, and mixed with 65 parts of turpentine, or 250 parts of ketone and 250 parts of ether; 500 parts or 750 parts of methyl alcohol is added, and a colorant, such as desired. Instead of turpentine, rosins derived from it may be employed. If the employment of camphor is desired to a certain extent, it may be added to the mixture. The whole is shaken and left at rest for about 12 hours. It is then passed between hot rollers, and finally pressed, cut, and dried, like ordinary celluloid.

The product thus obtained is without odor, when camphor is not employed; and in appearance and properties it cannot be distinguished from ordinary celluloid, while the expense of production is considerably reduced.

Formol Albumen for Preparation of Celluloid.—Formol has the property of forming combinations with most albuminoid substances. These are not identical with reference to plasticity, and the use which may be derived from them for the manufacture of plastic substances. This difference explains why albumen should not be confounded with gelatin or casein. With this in view, the Société Anonyme l'Oyonnaxienne has originated the following processes:

I.—The albumen may be that of the egg or that of the blood, which are readily found in trade. The formolizing may be effected in the moist state or in the dry state. The dry or moist albumen is brought into contact with the solution of commercial formol diluted to 5 or 10 per cent for an hour. Care must be taken to pulverize the albumen, if it is dry. The formol penetrates rapidly into the albuminoid matter, and is filtered or decanted and washed with water until all the formol in excess has completely disappeared; this it is easy to ascertain by means of aniline water, which produces a turbid white as long as a trace of formic aldehyde remains.

The formol albumen is afterwards dried at low temperature by submitting it to the action of a current of dry air at a temperature not exceeding 107° F. Thus obtained, the product appears as a transparent corneous substance. On pulverizing, it becomes opaque and loses its transparency. It is completely insoluble in water, but swells in this liquid.

II.—The formol albumen is reduced to a perfectly homogeneous powder, and mixed intimately with the plastic matter before rolling. This cannot be considered an adequate means for effecting the mixture. It is necessary to introduce the formol albumen, in the course of the moistening, either by making an emulsion with camphor alcohol, or by mixing it thoroughly with nitro-cellulose, or by making simultaneously a thorough mixture of the three substances. When the mixture is accomplished, the paste is rolled according to the usual operation. The quantity of formol albumen to add is variable, being diminished according to the quantity of camphor.

Instead of adding the desiccated formol albumen, it may previously be swollen in water in order to render it more malleable.

Instead of simple water, alkalinized or acidified water may be taken for this purpose, or even alcoholized water. The albumen, then, should be pressed between paper or cloth, in order to remove the excess of moisture.

Plastic Substances of Nitro-Cellulose Base.—To manufacture plastic substances the Compagnie Française du Celluloid commences by submitting casein to a special operation. It is soaked with a solution of acetate of urea in alcohol; for 100 parts of casein 5 parts of acetate of urea and 50 parts of alcohol are employed. The mass swells, and in 48 hours the casein is thoroughly penetrated. It is then ready to be incorporated with the camphored nitro-cellulose. The nitro-cellulose, having received the addition of camphor, is soaked in the alcohol, and the mass is well mixed. The casein prepared as described is introduced into the mass. The whole is mixed and left at rest for 2 days.

The plastic pulp thus obtained is rolled, cut, and dried like ordinary cellulose, and by the same processes and apparatus. The pulp may also be converted into tubes and other forms, like ordinary celluloid.

It is advisable to subject the improved plastic pulp to a treatment with formaldehyde for the purpose of rendering insoluble the casein incorporated in the celluloid. The plastic product of nitro-cellulose base, thus obtained, presents in employment the same general properties as ordinary celluloid. It may be applied to the various manufacturing processes in use for the preparation of articles of all kinds, and its cost price diminishes more or less according to the proportion of casein associated with the ordinary celluloid. In this plastic product various colorants may be incorporated, and the appearance of shell, pearl, wood, marble, or ivory may also be imparted.

Improved Celluloid.—This product is obtained by mingling with celluloid, under suitable conditions, gelatin or strong glue of gelatin base. It is clear that the replacement of part of the celluloid by the gelatin, of which the cost is much less, lowers materially the cost of the final product. The result is obtained without detriment to the qualities of the objects. These are said to be of superior properties, having more firmness than those of celluloid. And the new material

is worked more readily than the celluloid employed alone.

The new product may be prepared in open air or in a closed vessel under pressure. When operated in the air, the gelatin is first immersed cold (in any form, and in a state more or less pure) in alcohol marking about 140° F., with the addition of a certain quantity (for example, 5 to 10 per cent) of crystallizable acetic acid. In a few hours the material has swollen considerably, and it is then introduced in alcohol of about 90 per cent, and at the same time the celluloid pulp (camphor and gun cotton), taking care to add a little acetone. The proportion of celluloid in the mixture may be 50 to 75 per cent of the weight of the gelatin, more or less, according to the result desired. After heating the mixture slightly, it is worked, cold, by the rollers ordinarily employed for celluloid and other similar pastes, or by any other suitable methods.

The preparation in a closed vessel does not differ from that which has been described, except for the introduction of the mixture of gelatin, celluloid, alcohol, and acetone, at the moment when the heating is to be accomplished in an autoclave heated with steam, capable of supporting a pressure of 2 to 5 pounds, and furnished with a mechanical agitator. This method of proceeding abridges the operation considerably; the paste comes from the autoclave well mingled, and is then submitted to the action of rollers. There is but little work in distilling the alcohol and acetic acid in the autoclave. These may be recovered, and on account of their evaporation the mass presents the desired consistency when it reaches the rollers. Whichever of the two methods of preparation may be employed, the substance may be rolled as in the ordinary process, if a boiler with agitator is made use of; the mass may be produced in any form.

Preparation of Uninflammable Celluloid.—The operation of this process by Woodward is the following: In a receiver of glass or porcelain, liquefied fish glue and gum arabic are introduced and allowed to swell for 24 hours in a very dry position, allowing the air to circulate freely. The receiver is not covered. Afterwards it is heated on a water bath, and the contents stirred (for example, by means of a porcelain spatula) until the gum is completely liquefied. The heating of the mass should not exceed 77° F. Then the gelatin is added in such a way that there are no solid pieces. The receiver is removed from the water bath and colza oil added, while agitating anew. When the mixture is complete it is left to repose for 24 hours.

Before cooling, the mixture is passed through a sieve in order to retain the pieces which may not have been dissolved. After swelling, and the dissolution and purification by means of the sieve, it is allowed to rest still in the same position, with access of air. The films formed while cooling may be removed. The treatment of celluloid necessitates employing a solution completely colorless and clear. The celluloid to be treated while it is still in the pasty state should be in a receiver of glass, porcelain, or similar material.

The mass containing the fish glue is poured in, drop by drop, while stirring carefully, taking care to pour it in the middle of the celluloid and to increase the surface of contact.

When the mixture is complete, the celluloid is ready to be employed and does not produce flame when exposed.

The solution of fish glue may be prepared by allowing 200 parts of it to swell for 48 hours in 1,000 parts of cold distilled water. It is then passed through the sieve, and the pieces which may remain are broken up, in order to mingle them thoroughly with the water. Ten parts of kitchen salt are then added, and the whole mass passed through the sieve.

This product may be utilized for the preparation of photographic films or for those used for cinematographs, or for replacing hard caoutchouc for the insulation of electric conductors, and for the preparation of plastic objects.

Substitute for Camphor in the Preparation of Celluloid and Applicable to Other Purposes.—In this process commercial oil of turpentine, after being rectified by distillation over caustic soda, is subjected to the action of gaseous chlorhydric acid, in order to produce the solid monochlorhydrate of turpentine. After having, by means of the press, extracted the liquid monochlorhydrate, and after several washings with cold water, the solid matter is desiccated and introduced into an autoclave apparatus capable of resisting a pressure of 6 atmospheres. Fifty per cent of caustic soda, calculated on the weight of the monochlorhydrate, and mingled with an equal quantity of alcohol, is added in the form of a thick solution. The apparatus is closed and heated for several hours at the temper-